

AMENDMENT TO THE CLAIMS:

This listing of the claims replaces all prior versions, and listings, of claims in the application.

1
2 1. (currently amended) A method for creating a multidimensional morphological
3 reconstruction of biological tissue data characterizing biological tissue comprising the steps of:
4 cutting histologically thin sections of said biological tissue ~~sample~~ to produce
5 first and second sets of alternating serial sections of said biological tissue;
6 mapping image data obtained from the first set of alternating serial sections
7 onto a tissue space coordinate system to construct a multidimensional morphological tissue space
8 matrix of image data ~~of the~~ ~~based on the~~ first set of alternating serial sections;
9 ~~unattendedly micro dissecting~~ ~~incising a grid pattern across~~ each serial section
10 in the second set of alternating serial sections ~~into~~ ~~create a set of~~ ~~micro dissected~~ ~~incised~~ section
11 samples ~~for each serial section of the second set of alternating serial sections;~~
12 ~~assigning a unique code to associating each~~ ~~micro dissected~~ ~~incised~~ section
13 sample ~~micro dissected~~ ~~incised~~ from the second set of alternating serial sections ~~with a unique set of~~
14 ~~indices to form a set of indexed~~ ~~coded~~ ~~micro dissected~~ ~~incised~~ section samples, with each unique
15 ~~code set of indices~~ indicating tissue space coordinates of each ~~coded~~ ~~indexed~~ ~~micro dissected~~ ~~incised~~
16 section sample in the morphological tissue space matrix;
17 ~~utilizing biological activity methods to analyze~~ ~~analyzing~~ each ~~coded~~ ~~indexed~~
18 ~~micro dissected~~ ~~incised~~ section sample to obtain biological data providing information on a plurality
19 of biological characteristics of the ~~coded~~ ~~indexed~~ ~~micro dissected~~ ~~incised~~ section sample; and
20 spatially mapping the biological data characterizing each ~~coded~~ ~~indexed~~ ~~micro~~
21 ~~dissected~~ ~~incised~~ section sample, ~~micro dissected~~ ~~incised~~ from the second set of alternating serial
22 sections, onto the multidimensional morphological tissue space matrix, constructed from the first set
23 of alternating serial sections, ~~utilizing the indices of an indexed incised section sample to~~ ~~and~~
24 ~~superimposing~~ the biological data of the ~~coded~~ ~~indexed~~ ~~micro dissected~~ ~~incised~~ section sample
25 upon volume image data ~~correlated to~~ ~~indicated by the code indices associated with~~ ~~assigned to the~~
26 ~~indexed~~ ~~coded~~ ~~micro dissected~~ ~~incised~~ section sample.

1 2. (currently amended) The method of claim 1 where said step of analyzing ~~utilizing~~
2 ~~biological activity methods to analyze~~ comprises the act of:

analyzing an incised section sample ~~the tissue sample~~ utilizing a monoclonal antibody binding to determine levels of proteins and other ligands.

3. (currently amended) The method of claim 1 where said step of analyzing ~~utilizing biological activity methods to analyze~~ comprises the act of:

analyzing a micro dissected section sample ~~the tissue sample~~ a micro array to determine levels of mRNA.

4. (currently amended) A method for creating a multidimensional morphological reconstruction of gene expression activity in a biological tissue sample comprising the steps of:

cutting histologically thin sections of said sample to produce first and second sets of alternating serial sample sections;

histologically-staining and coverslipping said first set of serial sample sections for light microscopy;

~~utilizing the first set of histologically stained serial sample sections to~~ constructing a multidimensional morphological spatial matrix of image data from the first set of histologically-stained serial sample sections;

mounting and covering the second set of serial sample sections with a micro dissection membrane;

~~unattendedly micro dissecting incising a grid pattern across each of the second set of serial sample sections into to form a plurality of micro dissected incised section samples grid-element sections on each serial sample section~~;

providing a set of coded micro dissected section sample indexed grid-element holders, with each coded micro dissected section sample holder having a code indicating a unique tissue space coordinate in the multidimensional morphological spatial matrix of image data indices indicating the identity of the serial sample section from which the grid element is incised and coordinate indices indicating the location of the grid sample element in the identified serial sample section;

transferring each micro dissected incised grid-element section sample to the ~~corresponding indexed~~ a coded micro dissected section sample grid-element holder having a code indicating the location of a transferred micro dissected section sample in the multidimensional

24 morphological spatial matrix of image data so that the indexed grid element holders form a spatial
25 array preserving the location of the grid elements in the tissue sample;
26 analyzing each coded micro dissected section sample grid element to obtain
27 biological gene expression data;
28 ~~utilizing the index data to~~ spatially superimposing gene expression data of
29 ~~each a micro dissected section sample grid element~~ onto the a spatial coordinate of the
30 multidimensional morphological matrix of image data indicated by the code of the coded micro
31 dissected section sample holder holding the micro dissected section sample.

5. (cancelled)

1 6. (currently amended) The method of claim 4 further comprising the step of:
2 generating displays correlating values of biological data with ~~corresponding~~
3 locations in the 3-D (three-dimensional) visualization.

1 7. (currently amended) A method for creating a multidimensional morphological
2 reconstruction of biological data characterizing a biological tissue sample comprising the steps of:
3 cutting histologically thin sections of said biological tissue sample to form a set of
4 serial sample sections;
5 constructing a multidimensional morphological spatial matrix of image data based on
6 the set of serial sample sections of said ~~first~~ biological tissue sample;
7 unattendedly micro dissecting ~~incising a grid pattern across~~ each serial section of said
8 ~~first~~ biological tissue sample into to form a multidimensional spatial matrix grid of coded indexed
9 micro dissected ~~incised~~ section samples, with a code assigned to indices of an a coded indexed micro
10 dissected ~~incised~~ section sample indicating the location of the coded indexed micro dissected ~~incised~~
11 section sample in the multidimensional spatial matrix grid;
12 analyzing each coded indexed micro dissected ~~incised~~ section sample to obtain
13 biological data characterizing the coded indexed micro dissected ~~incised~~ section sample; and
14 ~~utilizing the indices of each indexed incised section sample to linking~~ the biological
15 data characterizing each coded indexed micro dissected ~~incised~~ section sample to the location in the
16 multidimensional morphological matrix of image data indicated by corresponding to the code indices
17 of the coded indexed micro dissected ~~incised~~ section sample.

8. (cancelled)

9. (currently amended) The method of claim 7 where:

each coded micro dissected ~~ineised~~ section sample ~~is corresponds to~~ a specific multidimensional volume image data element of ~~from~~ the multidimensional morphological spatial matrix of image data based on said biological tissue sample, and where each such coded micro dissected ~~ineised~~ section sample contains all of the tissue used to produce said volume image data.

10. (currently amended) The method of claim 7 where:

each coded indexed micro dissected ~~ineised~~ section sample ~~is corresponds, either directly or indirectly, to~~ a specific range of multidimensional volume image data from the multidimensional morphological spatial matrix of image data based on said biological tissue sample.

11. (currently amended) A system for creating a multidimensional morphological reconstruction of biological data characterizing a ~~first~~ biological tissue sample comprising:

means for cutting histologically thin sections of said biological tissue sample to form a set of serial sample sections;

means for constructing a multidimensional morphological spatial matrix of image data based on the set of serial sample sections of said ~~first~~ biological tissue sample;

means for unattendedly micro dissecting ~~ineising a grid pattern across~~ each serial section of said ~~first~~ biological tissue sample ~~to form into~~ a multidimensional spatial matrix grid of coded indexed micro dissected ~~ineised~~ section samples, with a code indices of an a coded indexed micro dissected ~~ineised~~ section sample indicating the location of the coded indexed micro dissected ~~ineised~~ section sample in the multidimensional spatial matrix grid;

means for analyzing each coded indexed micro dissected ~~ineised~~ section sample to obtain biological data characterizing the coded indexed micro dissected ~~ineised~~ section sample; and

means for ~~utilizing the indices of each indexed ineised section sample to linking the~~ biological data characterizing each coded indexed micro dissected ~~ineised~~ section sample to the location in the multidimensional morphological matrix of image data indicated by ~~corresponding to~~ the code indices of the coded indexed micro dissected ~~ineised~~ section sample.